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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,304	03/24/2004	Toshimitsu Kariya	03500.017974	3813

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EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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12/31/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/807,304	Applicant(s) KARIYA, TOSHIMITSU	
	Examiner Jeffrey T. Barton	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20040831, 20040922</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-3 in the reply filed on 18 October 2007 is acknowledged. Claims 4 and 5 are withdrawn as drawn to a nonelected invention.

Specification

2. The disclosure is objected to because of the following informalities: throughout the specification, the element "phosphorus" is referred to as "phosphor". Each instance of this should be corrected to recite the correct name of the element.

Appropriate correction is required.

Claim Objections

3. Claim 1 is objected to because of the following informalities: At lines 10 and 11 of the claim the element "phosphorus" is referred to as "phosphor". The claim should be amended to recite the correct name of the element. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano et al (JP 11-243218) in view of Kondo. (US 6,103,138) A machine translation of Sano et al that was relied upon in interpreting Sano et al has been made of record, and is enclosed with this Office Action.

Regarding claims 1 and 2, Sano et al disclose a stacked photovoltaic element comprising a structure (Figure 1) formed by sequentially arranging a metal layer (101), lower transparent conductive layer (102), first n-type microcrystalline silicon layer (103), first i-type microcrystalline silicon layer (105), first p-type non-single crystal silicon layer (107), a second n-type microcrystalline silicon layer (108), a second i-type microcrystalline silicon layer (110), and a second p-type non-single crystal silicon layer (111) on a support body (100). Sano et al further disclose sequentially laying a third n-type non-single crystal silicon layer (112), a third i-layer of amorphous silicon (113), a third p-type non-single crystal silicon layer (114), and upper transparent conductive

layer of ITO (115) on and in contact with the second p-layer. (Figure 1; Paragraphs 0078-0081; 0091-0148)

Sano et al do not explicitly disclose the first and second i-type layers containing phosphorus, such that the content ratio of P:Si of the first i-type layer is greater than that of the second i-type layer.

Kondo et al teaches single and tandem photovoltaic cells formed from p-i-n junctions having microcrystalline i-type layers (Figures 1 and 4; microcrystalline i-type layer 102b; Column 7, lines 23-30), wherein the i-type layer(s) comprise phosphorus at levels of 1 ppm or more, with examples provided at 3 ppm (Table 2; Column 9, lines 29-42) In addition, Kondo et al teach that it is preferred that the phosphorus is unevenly distributed in the films, with concentration increasing towards the electroconductive substrate 101, which is analogous to the substrate 120 of Figure 1 of Sano et al. This preference is due to the presence of higher grain boundary densities closer to this substrate, allowing the phosphorus atoms to exhibit their favorable effect more efficiently in this region. (Column 4, lines 9-19)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the tandem cell of Sano et al by incorporating phosphorus into the i-type microcrystalline layers 105 and 110 at levels of about 3 ppm, as taught by Kondo, because Kondo teaches that providing phosphorus to the layers in this amount allows faster deposition of the cell layers with much less pronounced degradation of photovoltaic properties. (Table 2; Column 9, lines 29-42) The benefits of faster cell production would have been clear to one having ordinary skill in the art.

It would also have been obvious to one having ordinary skill in the art at the time the invention was made to provide a somewhat greater concentration of phosphorus to the first i-type layer (105) than to the second i-type layer (110), because layer 105 lies closer to electroconductive substrate 120 than layer 110, and Kondo teaches that it is preferred to provide a higher phosphorus concentration closer to the electroconductive substrate, because the phosphorus atoms exhibit their favorable effect more efficiently in this region. (Column 4, lines 9-19)

Regarding claim 3, Kondo teaches phosphorus concentrations of at least 1 ppm, with the examples using 3 ppm concentration. (Table 2; Column 9, lines 29-42) Within the combined cell, it would have been obvious to select phosphorus concentrations corresponding to the levels disclosed in Kondo.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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JTB
21 December 2007